profession who like to try new things are perhaps likely to get the idea that something new has really been proven against friend tobacco. We are willing to accept it when it has been proven, but not yet. Anthropologists estimate that tobacco has been used in this country for about 14,000 years, and I truly hope that we may continue to use it for about 14,000 years more.

DISCUSSION

STATED MEETING—FEBRUARY 2, 1933

ROBERT H. HALSEY

In a discussion of this kind, one hesitates because he feels that perhaps he may create the impression that he intends unnecessarily to take some of the joy out of life.

So far we have listened to reports of cases where the etiology is ascribed to tobacco but the etiology is not proven. There is a suspicion of tobacco because pain, a symptom, is aggravated in some who use tobacco. So far, I agree with Dr. Brooks who has well said, that etiologically there is no proof of any effect on the angina, if we refer to the arterial condition in the heart and not to the complaint, pain, which is merely a symptom. If we are including in the term the arterio-sclerotic changes in the coronary artery that is the result of disease, but if we refer by the term to the pain produced in the chest by the use of tobacco, it is a very different problem. We know that smoking tobacco does increase the severity or degree of pain in some and that is the reason why most physicians suggest discontinuing the use of tobacco.

It has been suggested two or three times that tobaccos differ in their nicotine content; thus, Cuban tobacco is said to contain 1 per cent to 3 per cent of nicotine, but French or Virginia may have as high as 6 per cent or 7 per cent. Turkish tobacco has only 2.5 per cent of nicotine and is said to be free from furfurol. But nicotine is not the only dele-

terious element contained in tobacco. It is the popular belief that the whole effect of tobacco is contained in nicotine, hence we hear and see the widely advertised denicotinized tobacco. The Connecticut Agricultural Experiment Station has told us that the much advertised and best processed denicotinized cigarettes are but little altered in their nicotine content. It also states that there are common untreated brands of tobacco in which the nicotine is even less than in the processed brands.

Tobacco smoke contains a good many things beside nicotine, such as pyridine to which the "smoker's throat" is due, carbon monoxide, furfurol (to which the headache is ascribed), irritant aldehyde, ammonia, hydrocyanic acid, volatile oil, phenols, quinoline, picoline, lutidine, collidine and perhaps some other substances in small amounts. What the full effect of these various substances is on the smoker, we do not know. Some work has been done to show the amount of carbon monoxide in the smoke may be sufficient actually to change the oxygen carrying power of the hemoglobin. In other words, we can get from the carbon monoxide of tobacco smoke some of the effects on the oxygen content of the blood that we theoretically think produces the pain in the so-called anginas. Some have shown that when anemia is present in the patient with angina, the pain may be more easily produced; for, the improvement of the anemia permits the patient to do things without the production of pain. Since the pain of angina may be increased by smoking tobacco it is possible that it is due to the relation of carbon monoxide and the oxygen carrying power of the blood. According to Barcroft there are three ways in which an anoxemia is produced: (1) not enough oxygen in the air, as at high altitudes; (2) not enough oxygen carried, as in anemia; (3) motion of blood too slow, as in congestion. Sir Thomas Lewis suggests that the pain may be due to the accumulation in the intercellular spaces of the products of physiologic contraction of the heart muscle and it is the washing out of these products by increased flow of blood that relieves the pain.

It has been stated here tonight that the development of intermittent claudication relieves the pain in the chest. This may be due to the greater relative limitation of effort by the claudication as contrasted with the coronary disease. The relief of the pain due to impaired coronary circulation under these conditions is probably due to the limitation of muscular or physical effort. The claudication restricts them to less muscular effort and this is within the limitation of the effort which the heart can sustain. It is not necessary to assume that there are changes in the blood vessels.

We have then three fundamental things to think about. What sure evidence have we of the effect of tobacco—there are changes in cardiac rate and rhythm—extra-systoles or premature contractions—Both these conditions clear up on the discontinuance of tobacco. Precordial or cardiac pain behaves the same way. These are symptoms due to physiologic reactions. But it does not follow that because nerve reactions can be increased or decreased by tobacco that there is an etiologic relation between these constituents and the production of coronary artery changes or athero-sclerosis.

DISCUSSION

STATED MEETING—FEBRUARY 2, 1933

LEWIS A. CONNER

I think that we all must have been struck with the fact that the two papers dealing with the effects of tobacco in man presented tonight are of a very different type from the usual article upon that subject with which we have been familiar in the past; which for the most part was filled with generalities and impressions, which often showed a bias either for or against tobacco, and which offered little in the way of concrete evidence. These papers and this work, it seems to me, are very impressive. The work is so appealing that I find myself able only by a conscious